

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 7,008,802 B2  
APPLICATION NO. : 09/870393  
DATED : March 7, 2006  
INVENTOR(S) : Zhimin Lu

Page 1 of 15

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

The title page showing an illustrative figure(s) 6, 7 and 11 should be deleted and substitute therefore the attached title page consisting of Figs. 6, 7 and 11.

The drawing sheets consisting of Fig(s) 1-12 should be deleted and substitute therefore the attached drawing sheets consisting of Fig(s) 1-12.

On page 1 of the Specification, in the Title, Delete "WATER" and insert --WAFER--, therefor.

In column 1, at line 2: Delete "WATER" and insert --WAFER--, therefor.

In column 8, at line 14: Delete "parameters" and insert --parameter  $f_i$  --, therefor.

In column 8, at line 16: Delete " $p_1$ " and insert -- $p_i$  --, therefor.

In column 10, at line 48: Delete " $\alpha_L$ " and insert --  $\Delta_L$  --, therefor.

In column 10, at line 48: Delete " $\alpha_R$ " and insert--  $\Delta_R$  --, therefor.

In column 10, at line 51: Delete "maybe" and insert --may be--, therefor.

In column 15, at line 50, in Claim 18: Delete " $(p_1-p_1')$ " and insert -- $(p_i-p'_i)$  --, therefor.

In column 15, at line 61, in Claim 19: Delete " $I_{\max}$ " and insert -- $I_{\max}$  --, therefor.

In column 15, at line 61, in Claim 19: Delete " $I_{\min}$ " and insert-- $I_{\min}$ --, therefor,

In column 15, at line 63, in Claim 19: Delete " $I_{\max}$ " and insert-- $I_{\max}$ --, therefor.

In column 15, at line 63, in Claim 19: Delete " $I_{\min}$ " and insert-- $I_{\min}$ --, therefor.

In column 16, at line 25, in Claim 21: Delete " $\Theta$ ;" and insert -- $\Theta_g$ --, therefor.

In column 16, at line 27, in Claim 21: Delete " $\Theta_x$ " and insert -- $\Theta_g$ --, therefor.

In column 16, at line 37, in Claim 22: After "in" delete "a".

In column 16, at approximately line 47, in Claim 22: Delete "axis" and insert --axis--, therefor.

In column 18, at line 12, in Claim 35: Delete "effector," and insert --effector;--, therefor.

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Page 2 of 15

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 18, at line 16, in Claim 35: Delete " $v_1^-$ ," and insert -- $v_i$  ;--, therefor.

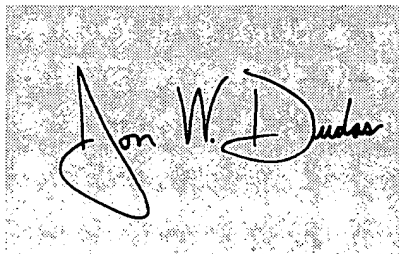
In column 18, at line 21, in Claim 35: Delete "(c)" and insert --(e)--, therefor.

In column 18, at line 25, in Claim 35: After "system" insert --if--.

This certificate supersedes Certificate of Correction issued January 16, 2007.

Signed and Sealed this

Sixth Day of February, 2007

A handwritten signature in black ink, reading "Jon W. Dudas", is positioned over a rectangular area with a light gray, textured background.

JON W. DUDAS  
*Director of the United States Patent and Trademark Office*

(12) **United States Patent**  
Lu

(16) Patent No.: **US 7,008,802 B2**  
(45) Date of Patent: **Mar. 7, 2006**

(54) **METHOD AND APPARATUS TO CORRECT WATER DRIFT**

(75) Inventor: **Zhimin Lu, Mesa, AZ (US)**

(73) Assignee: **ASM America, Inc., Phoenix, AZ (US)**

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 766 days.

(21) Appl. No.: **09/870,383**

(22) Filed: **May 29, 2001**

(65) Prior Publication Data

US 2004/015174 A1 Aug. 5, 2004

(51) Int. Cl.

**H01L 21/00** (2006.01)

**B65H 1/00** (2006.01)

**H01H 11/00** (2006.01)

**G01C 25/00** (2006.01)

(52) U.S. Cl. **438/7; 414/936; 250/206.1; 350/623; 702/150**

(58) Field of Classification Search **438/5, 438/7, 14, 16, 250/252.1, 206, 206.1, 206.2, 250/578.1, 234-236, 700/121, 702/87, 94-95, 702/150; 414/816, 930; 356/614, 615, 622**  
See application file for complete search history.

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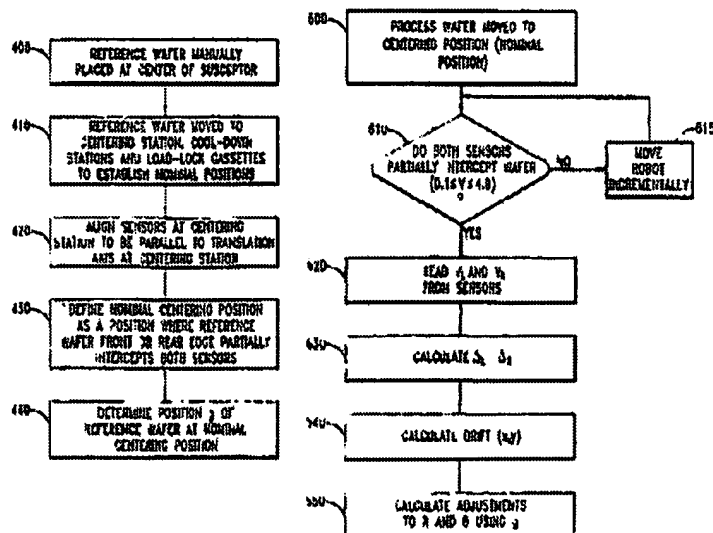
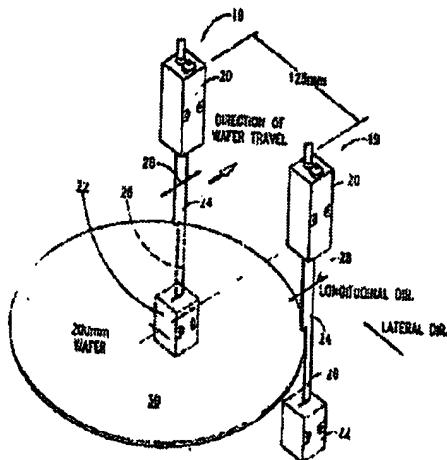
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(74) Attorney, Agent, or Firm **Knobbs, Martin, Olson & Rear, LLP**

(57) **ABSTRACT**

A method and apparatus is provided for determining workpiece drift from its nominal or intended position. The apparatus includes two proportionate sensors, each of which gives an output reading that depends upon how much of the sensor beam is blocked by an edge of the workpiece. A computer can calculate positional drift based upon these readings. Also disclosed is a method for aligning proportionate sensors to be parallel to one another.

45 Claims, 12 Drawing Sheets



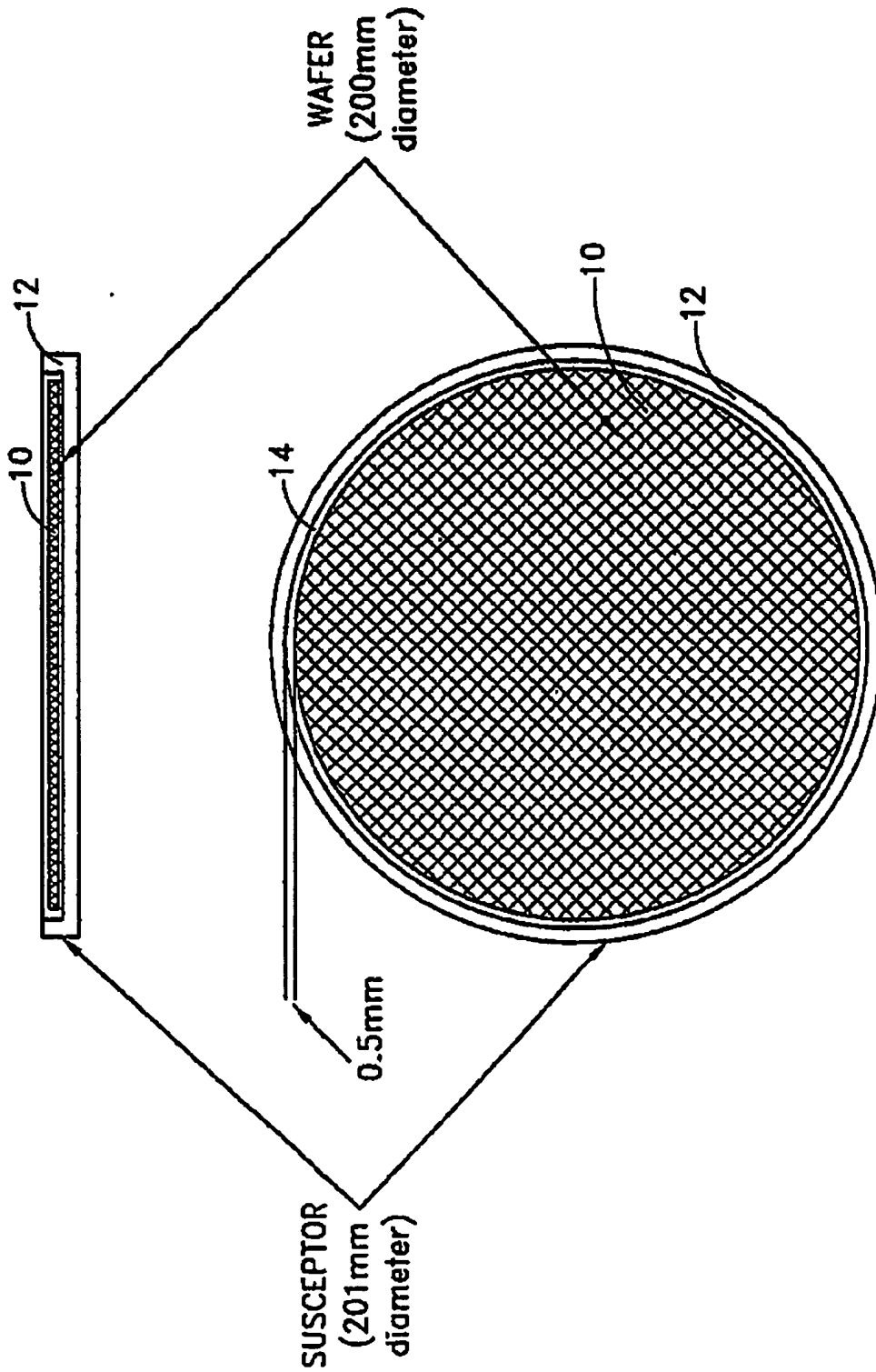


FIG. 1

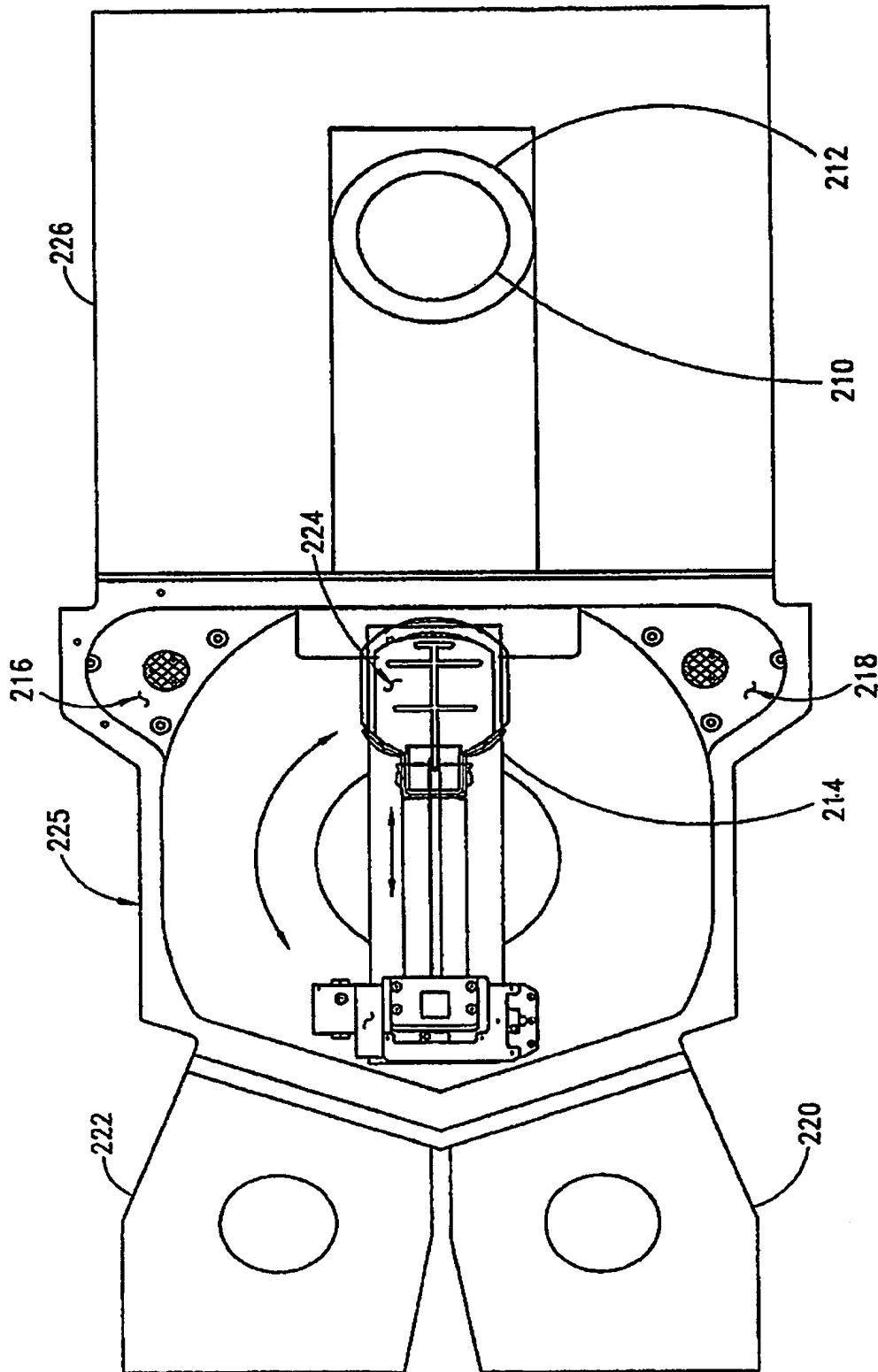
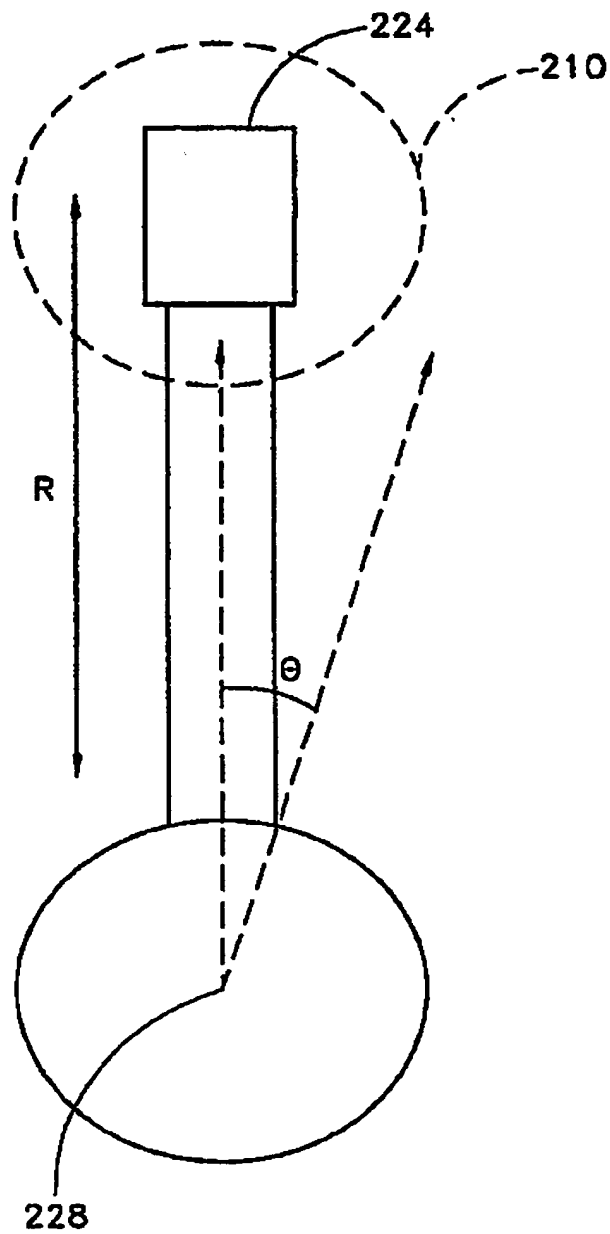
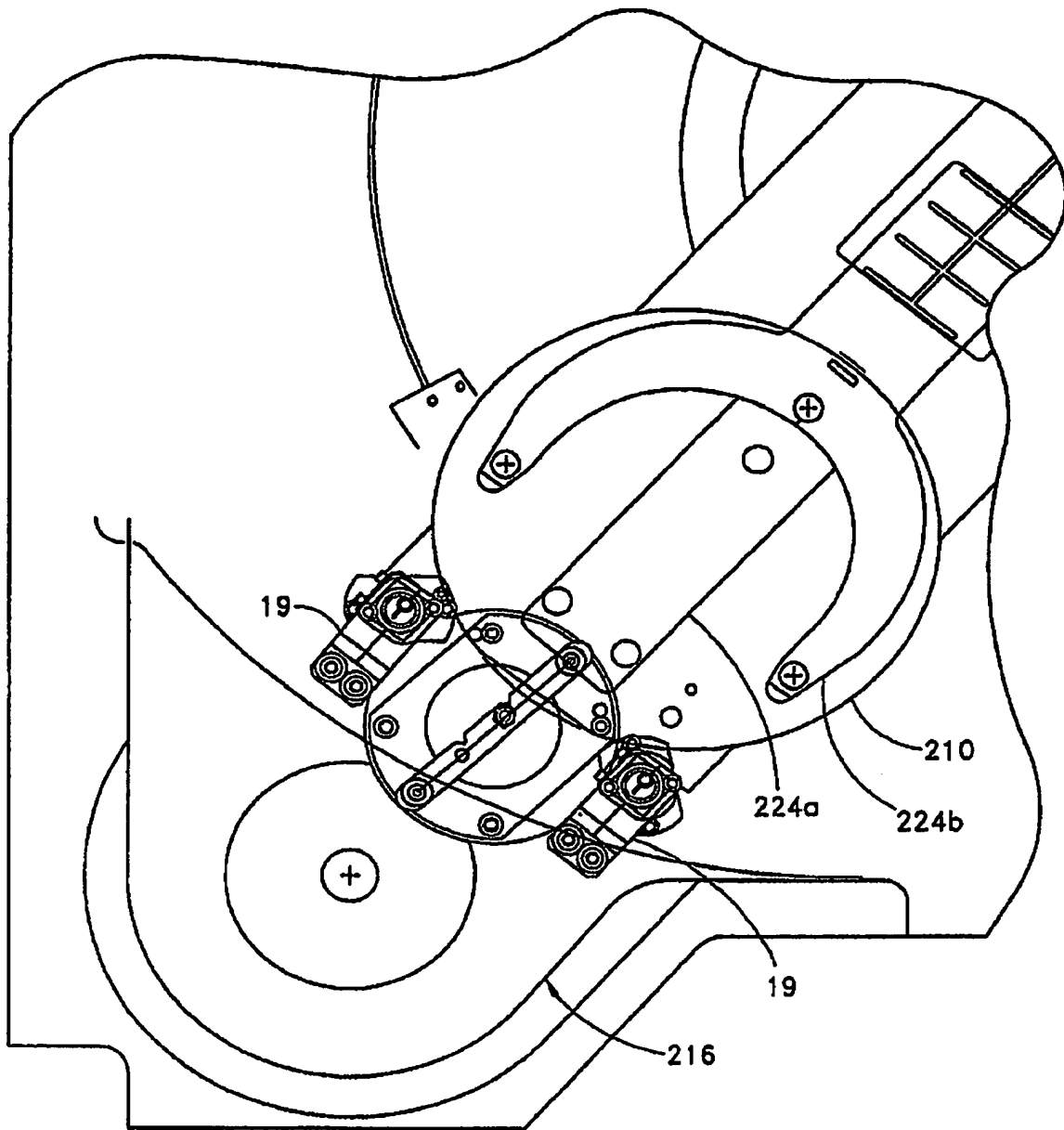
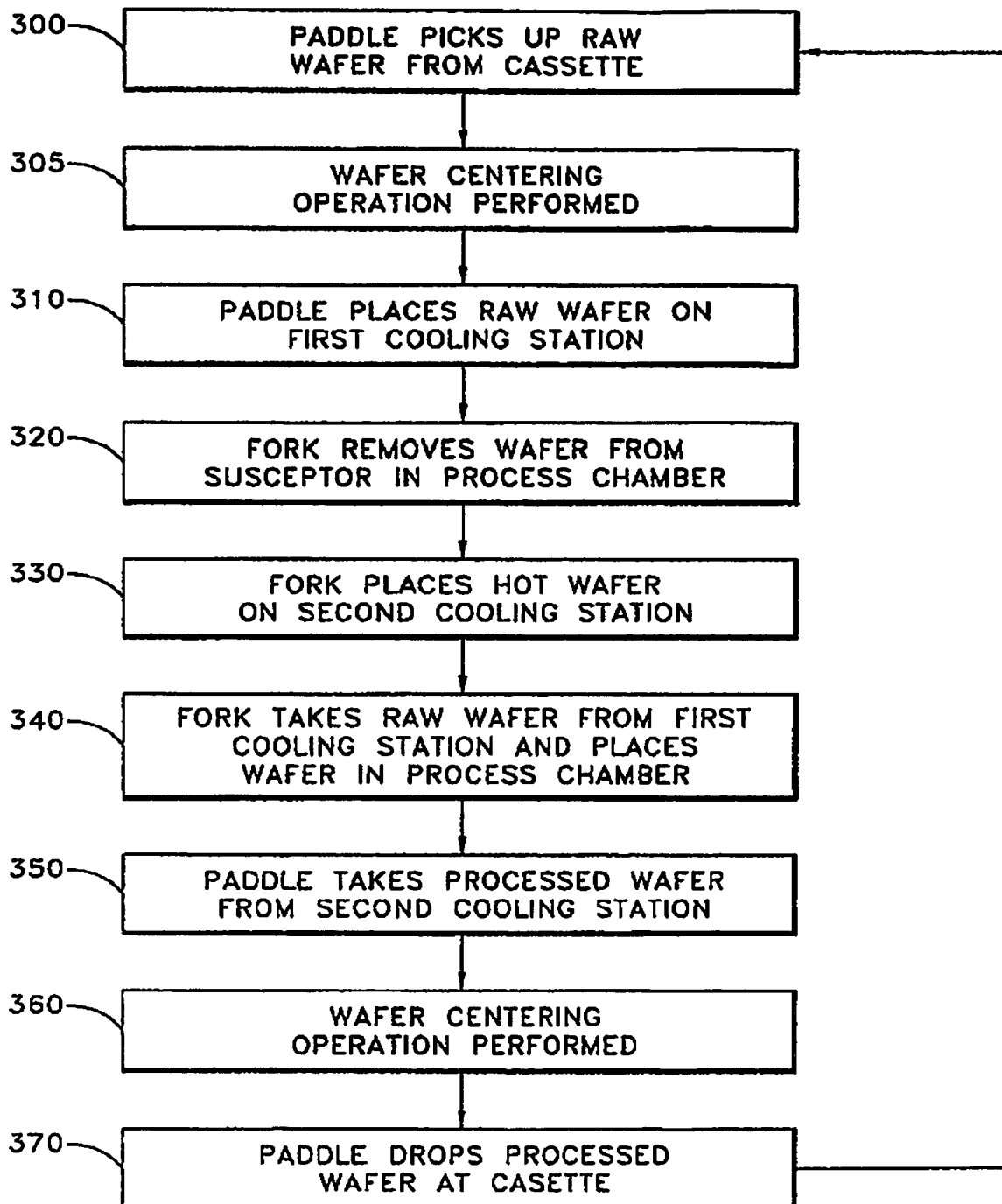


FIG. 2A

*FIG. 2B*



*FIG. 2C*

*FIG. 3*



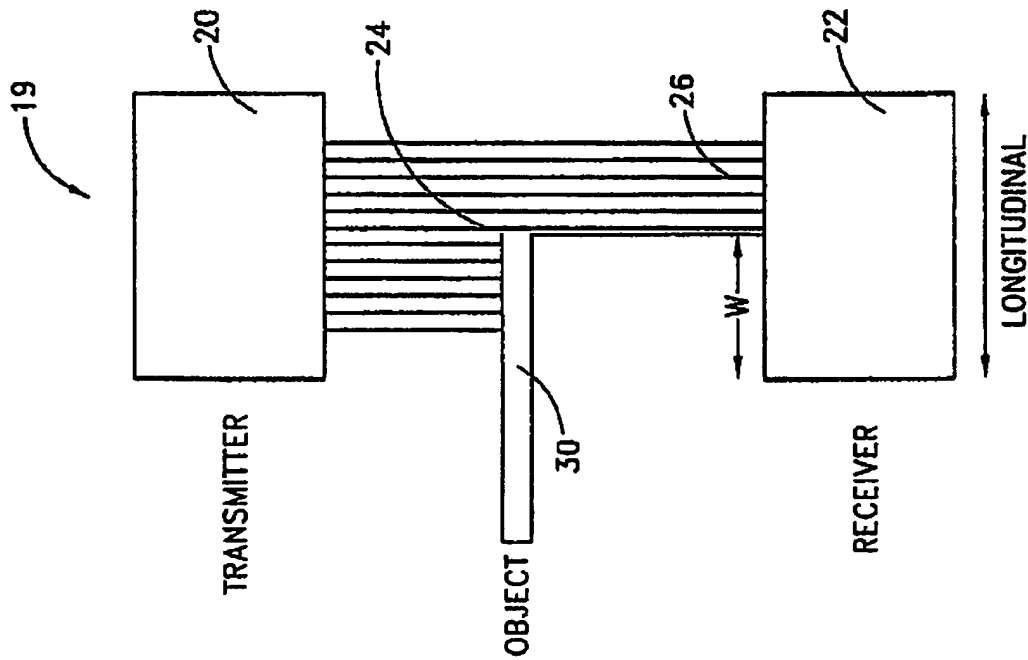


FIG. 4

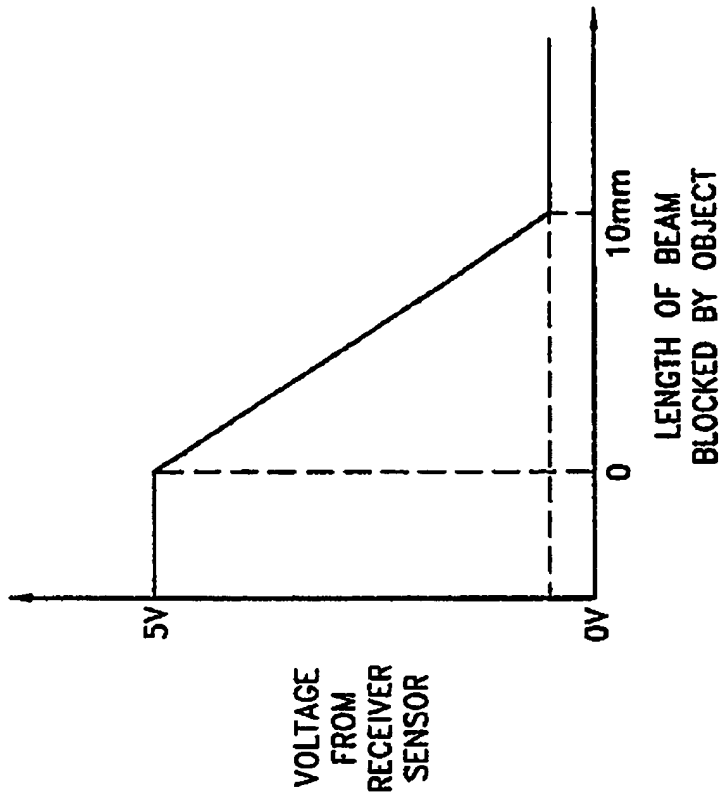


FIG. 5

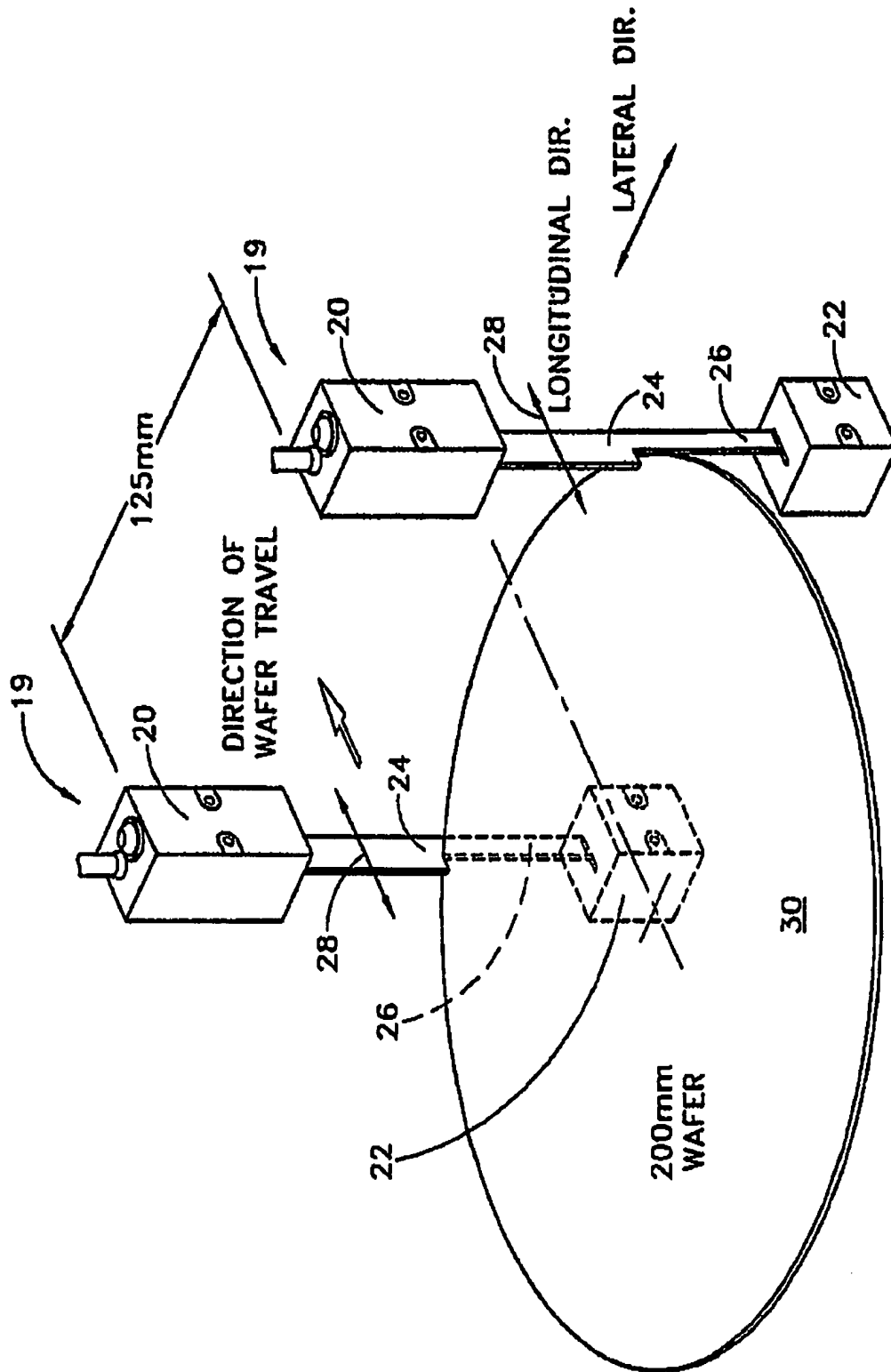
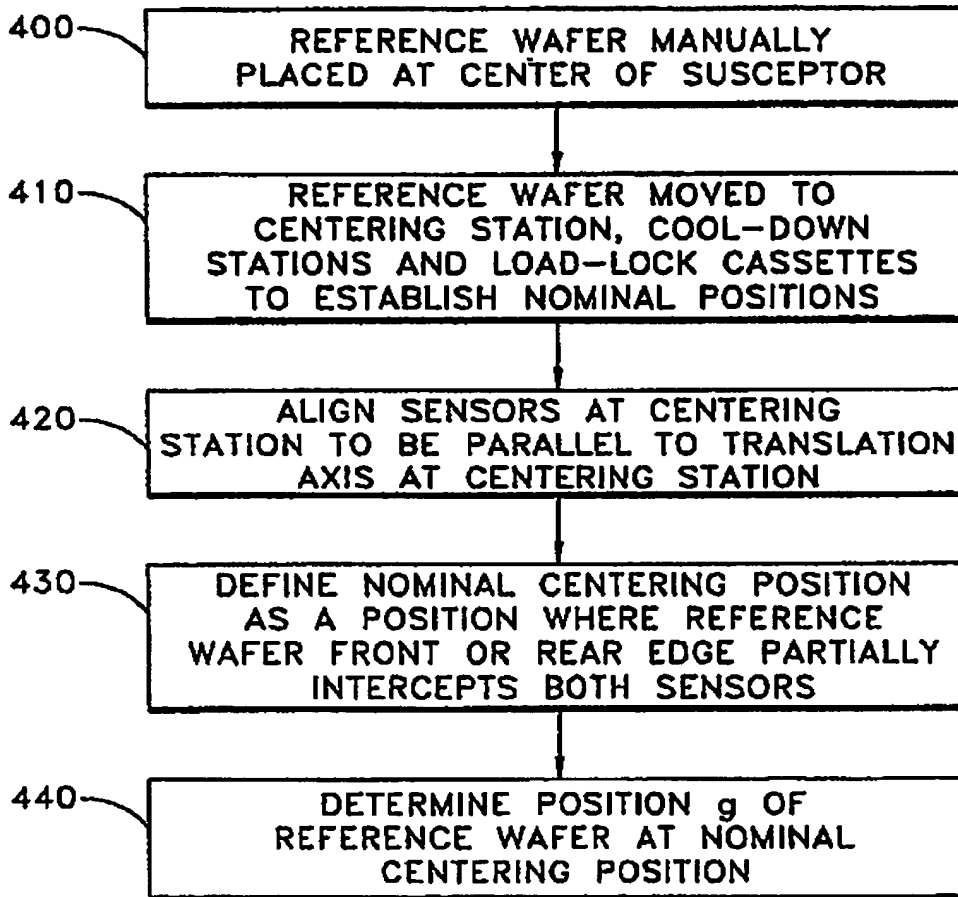


FIG. 6

*FIG. 7*

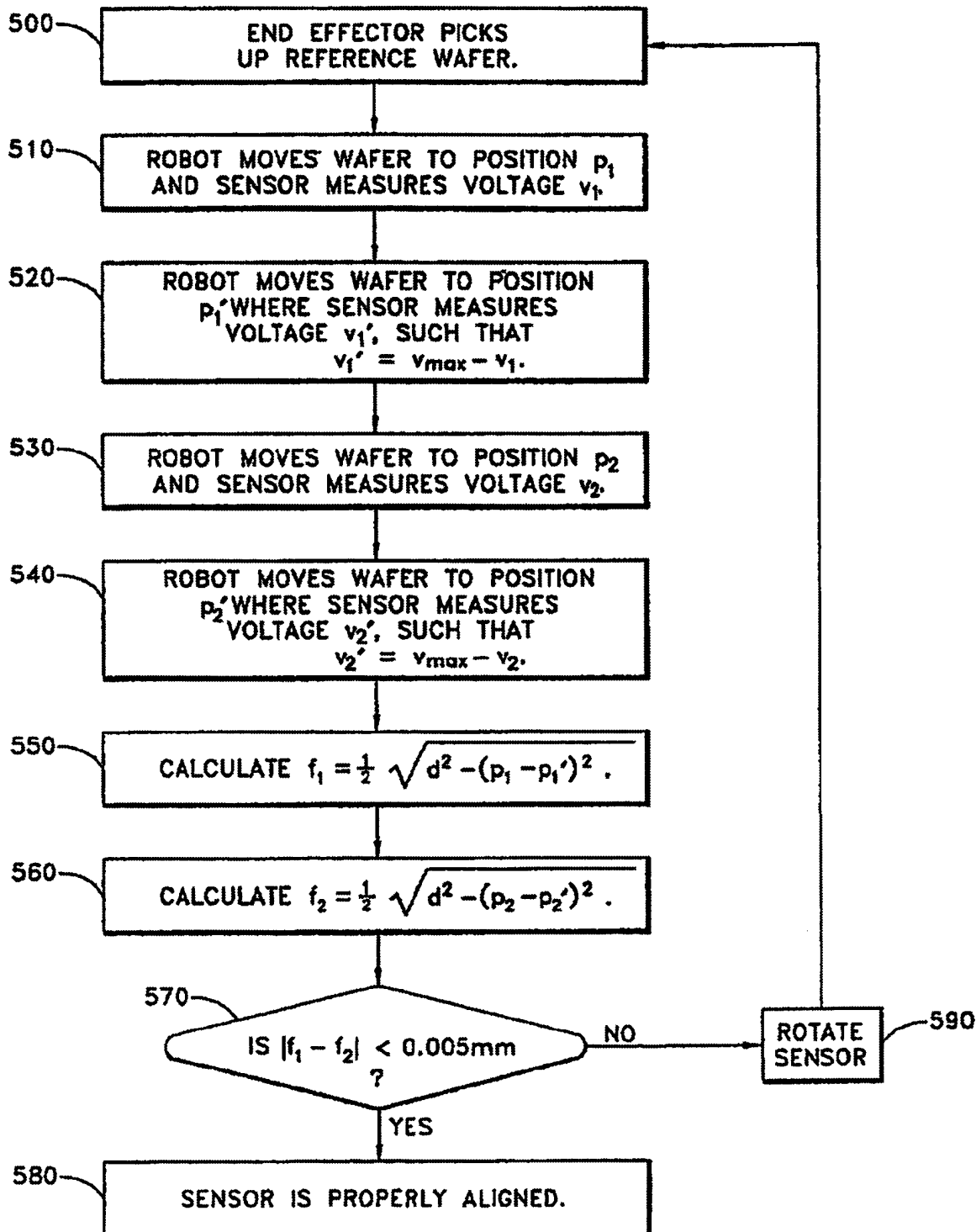


FIG. 8

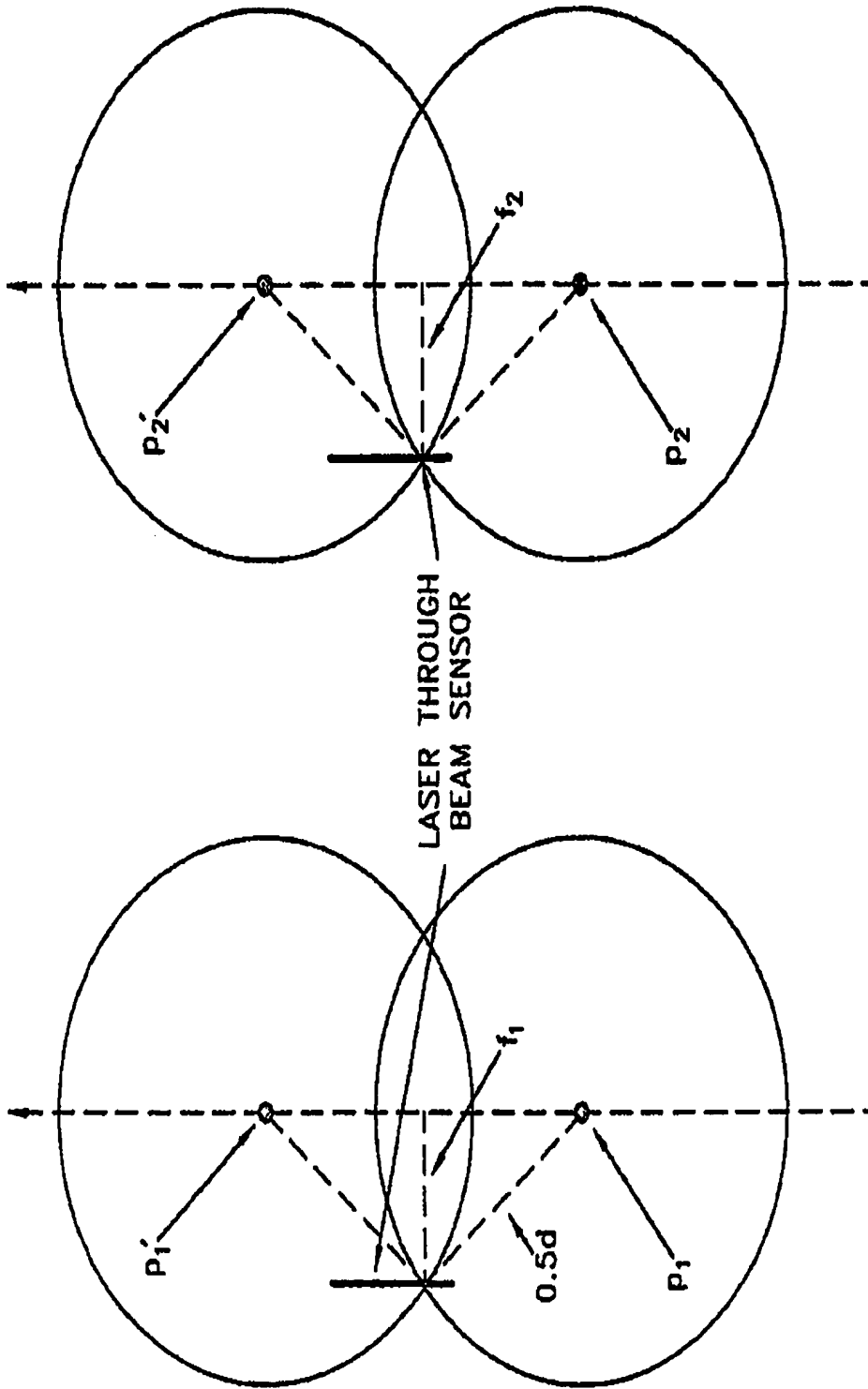
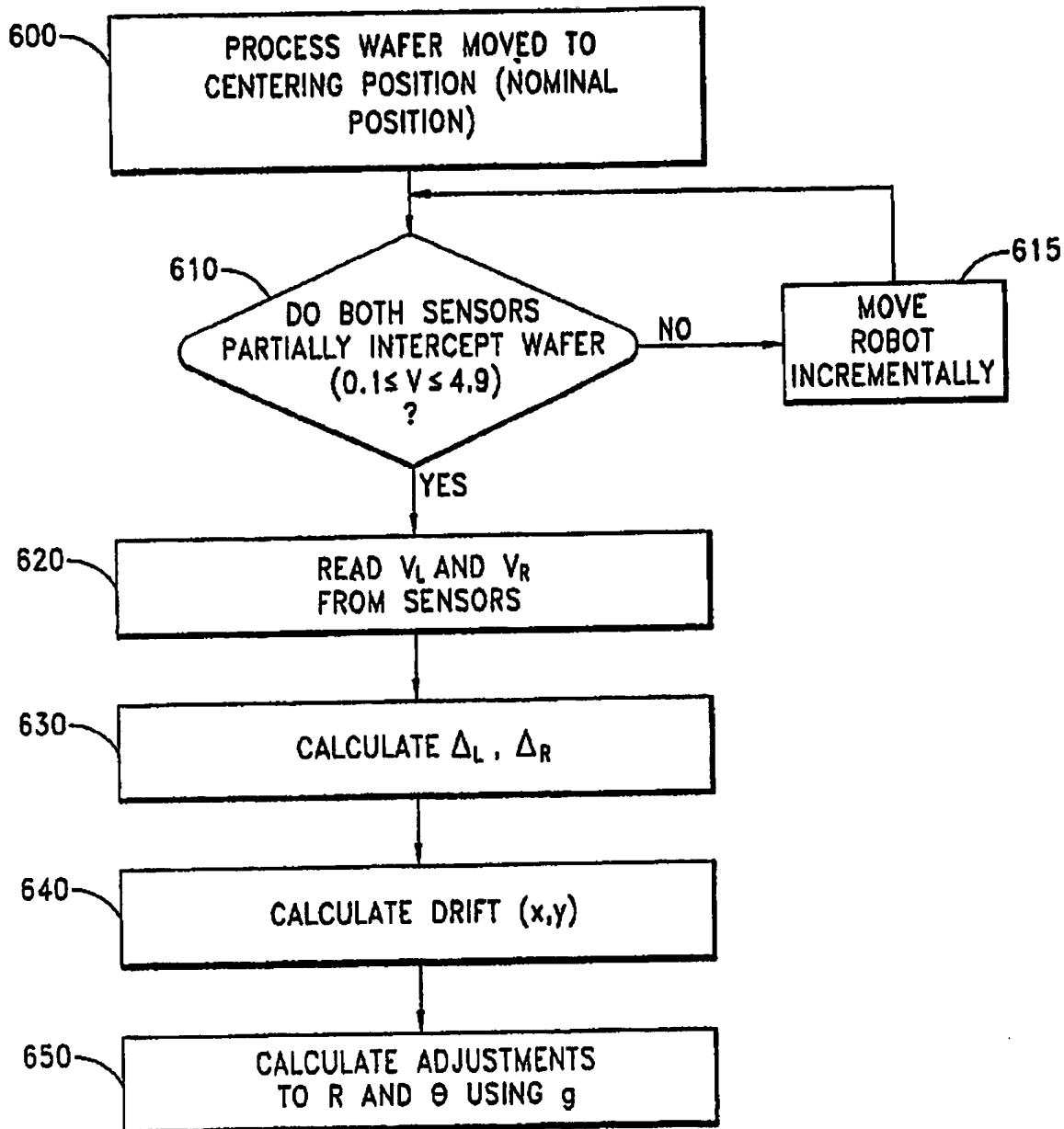


FIG. 10

FIG. 9

*FIG. 11*

## WAFER POSITION/ERROR CALCULATION

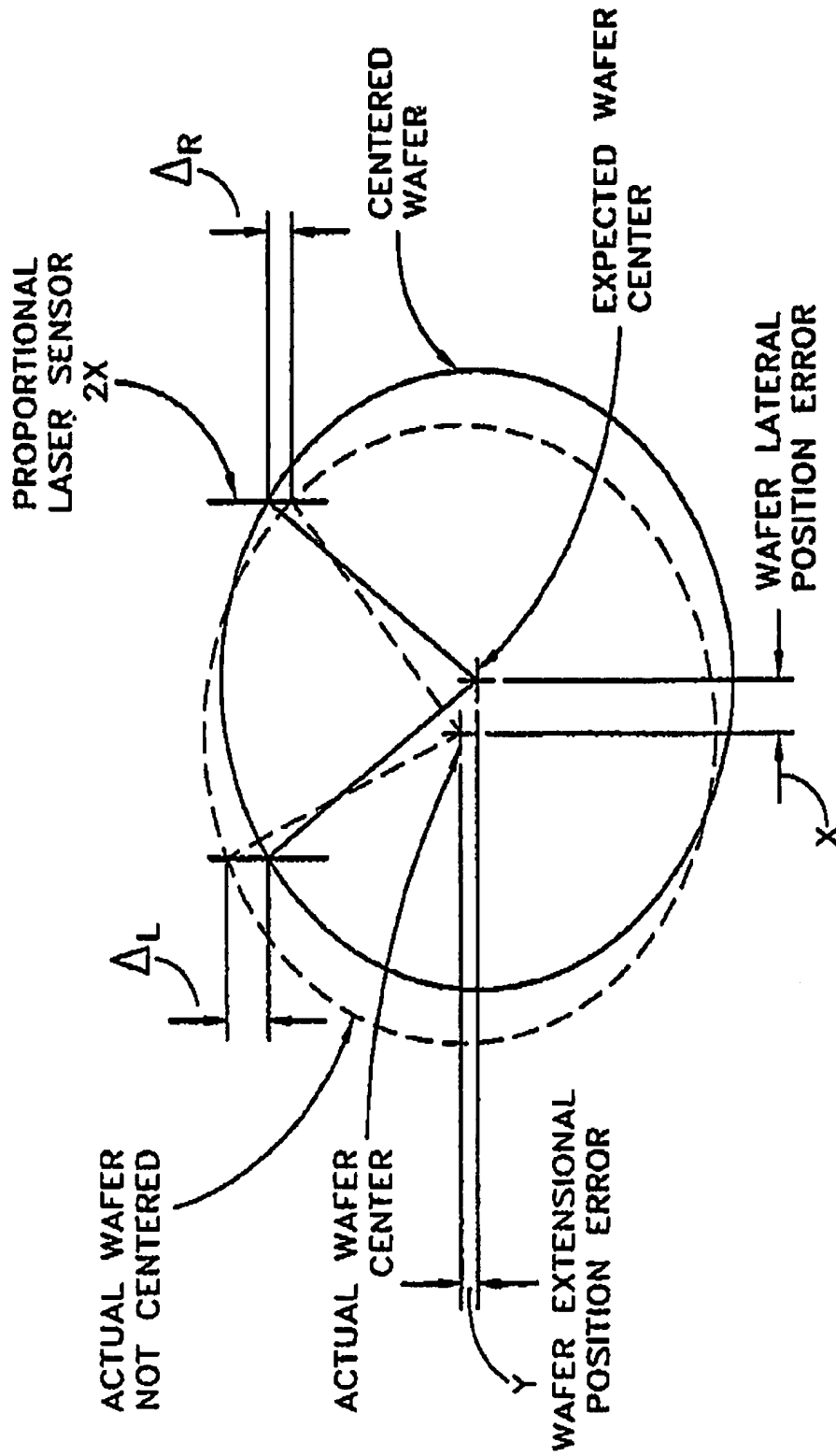


FIG. 12